ARCCO POWER SYSTEMS

GENERAC INDUSTRIAL POWER

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8800 South Claiborne Avenue
New Orleans, LA 70118
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Ship to: TBD

Project: SWBNO-EMD Generator Purchase 2500KW 25Hz

We are pleased to submit the following proposal for your consideration. This quote includes the standard accessories provided by our factory with the optional equipment and services as identified in this proposal.

Additionally, we have detailed the equipment configuration and services relative to our understanding of these requirements in the body of this document. Please check it for correctness and completeness to be certain that it meets your needs. Please contact us for any clarifications or refinements that may be necessary to meet the scope of the project, as you understand it.

We are firmly committed to providing the best possible support and service during the life cycle of this project. Below you will find our Proposed for enclosed EMD powered gensets to provide a per unit, net output rating of: approx. 2500kW , 6600V, 25Hz.

Bill of Material highlights include – see Attachment A for detailed technical information:

- Engine: 20-645-F EMD Diesel Engine, Fully Rebuilt to Zero Hour factory specifications
  - Built to meet EPA Tier 2 standards
  - Utility grade switchgear with Load Share controls
- Generator: ASEA (ABB), 12MW, 13.8kV, 1800rpm
  - Will be operated at 750rpm and each unit will generate 2500kW @ 6600V
- Air start system include compressor, storage tank and air connections
- Emergency Black Start Generator set and ATS – 1000kVA, 480V, 3ph
- Shipping to jobsite curb included
- Standard Generator Set Startup and Commissioning, up to 3 days onsite labor per unit – travel and per diem included
- Training for SWB included – up to 3 days, single trip
- Two Year Parts and Labor Warranty – starts upon completion of startup

- Lead time ~7-12 days departure from factory after receipt of deposit

VALIDITY: This proposal is valid for 30 calendar days.
NOT INCLUDED IN PRICE:

- Utility power – 1000kVA, 480V, 3ph – total power needed for all (5) units
- Bulk fuel storage, fuel handling equipment and fuel piping/connection to genset
- Operating Spares
- Electrical Distribution from generator set output to grid connection point
- Any and all VAT taxes, taxes, fees, customs etc.
- Permits, to include but not limited to, electrical, construction, environmental, etc
- Any and all items not specifically included in this quotation

Customer Responsibilities include the following:

- Site preparation and access for commencement of site works
- Fuel system(s)/piping and making of connections
- Any and all federal, state, county, excise taxes
- Site Crane for the unloading of all equipment and site material handling equipment
- Fuel storage tank(s) and fuel supply/consumables for start-up, testing and commercial operation of generator set
- Any and all permits required
- Coordinated shut downs of existing power supply to site as required for installation services

Attachment A: Technical Data

ENGINE: EMD 20/645F4b Two Stroke Diesel Fired Engine

Engine Model	**20/645EF4b**
Engine continuous rating	**3600 hp continuous @ ~750 rpm**
Bore	**9 1/16" (23.02 cm)**
Stroke	**10" (25.4 cm)**
Arrangement & No. of Cylinders	**V-20**
Approx. dry weight – engine only	**44,000 lbs.**
Rotation from Flywheel end	**Counterclockwise**

- *Engine Systems*
  - **Lube Oil System – skid mounted**
  - **Engine driven lube oil pump**
  - **Pressure relief and regulating valve**
  - **Automatic lube oil filter with integral centrifuge. Includes bypass, safety net, counter flanges and pressure drop indicator installed in accessory rack**
  - **Plate type oil cooler**
  - **Engine "HOT START" Preheat system**

- *Cooling Water System*
  - **Double Core Integrally Mounted Radiators designed for up to 120 degrees F ambient**
  - **Expansion Tank, dual chamber, site glasses and level detection**
  - **Forced draft design**
  - **Electric motor and VFD motor starters**
  - **Vertical air discharge**
  - **Engine driven fresh water pumps**

- *Intake Air System*
  - **Fiber type air intake filter & filter housing**
  - **Flexible air inlet duct and clamps, air filter to turbocharger inlet**

- *Exhaust System*
  - **Exhaust stack transition section (rectangular to 20" diameter round)**

- *Engine Start System*
  - **Air driven engine starters (2)**
  - **Air compressor, storage tank, piping and connections**

- *Exhaust System*
  - **Exhaust manifold blanket**
  - **Exhaust stack transition section (rectangular to 20" diameter round)**
  - **Exhaust stack, duct work and required supports**
  - **Exhaust silencer, ~30 dba noise reduction design**
  - **Expansion joints – two (2) – 300 series stainless steel – 24" nominal diameter**
- *Control System*
  - **Advanced Engine/Generator Controls System**
  - **Preemptive/Predictive Maintenance Control System 2100**
  - **Control room Operator Touch Screen/Display – with remote operating and monitoring features**

- *Engine Auxiliary Accessory Rack*
  - **Integral common skid mounted accessory rack with prelube**
  - **Lube oil and fuel oil filtration equipment with pressure and temperature gauge panel with local pipe mounted temp and jacket water pressure and temperature gauges**

- *Switchgear (integrated in power module)*
  - **Generator Circuit Breaker**
  - **Metering & Relaying (to be confirmed and modified as necessary)**
    - **600/5 CT's (3)**
    - **6600/120 Pt's (3-phase Delta) – generator**
    - **4160/120 PT's (1-phase Delta) – Bus – for synchronizing**
    - **Voltage regulator**
    - **Synchronizer with sync check**
    - **Schweitzer Relay**
  - **Master control system with touch screen HMI**
  - **Woodward Speed/Load governor controls and Basler Voltage Regulation System**

- *Alternator - rebuilt*

Rotational speed:	**~750 rpm**
Continuous power rating:	**2500kWe**
Rating:	**6600 VAC, 25Hz**
Power Factor:	**1.0**
Connection:	**4 wire Wye**
Temperature rise:	**Class F**
Rated Altitude:	**Up to 1000 meters**
Insulation:	**Class F**
Enclosure design:	**IP 23**
Cable entry	**Right hand side facing drive end**
Bearings:	**Anti-friction bearing**
Voltage regulator:	**Basler DECS250**
Excitation:	**Brushless**
Temperature monitoring:	**6 RTD's 2 per phase 100Ω platinum 1 RTD 1 per bearing 100Ω platinum**
Space heater:	**500W**

  - **CTs for differential protection**
  - **CT (1 phase) fault protection**
- *Competed Power Module*: **Total Weight approximately 150,000 lbs**
  - **~60' fabricated structural steel main base frame with 53' ISO Steel Container with integral accessory rack, radiator, silencer, with 11' L x 8' W x11'6 H integral climate controlled switchgears/controls room compartment.**

- **Total Overall Dimensions approx. ~60 ft (Length) X 8 ft (Width) X 11 ft. 6 in. (Height)**
- **Four point lifting arrangement**

- *Applicable Standards*

• **Diesel**	**Diesel #2**
• **Alternator**	**NEMA MG1, IEEE, IEC 60034-1**
• **Control Panel**	**NEMA ICS1, NEMA ICS1-4, NEMA PB1, NEMA 107**
• **Switchgear**	**IEC 60298, 60694, 60056**
• **Electrical Instrumentation**	**ISA, IEC/EN 60044-1**
• **Transformers**	**ANSI C57, NEMA, IEE, IEC 60076**
• **Electrical Components**	**NEMA 250, NEMA 4 or 12, AB1, AB3, FB1 & 107, IEC 60947-4-1, IEC 60947-4-2**
• **Piping on generator set**	**Manufacturer's standard**
• **Air compressor tank**	**ASME/CE PDE**

- *Factory Load Testing of Assembled Generator Set – to be completed at job site*

During load test, the following will be recorded:

- **Power**
- **Current**
- **Voltage**
- **Engine temperatures**

Standard Loading Test as follows:

- **15 minutes at 25% load**
- **15 minutes at 50% load**
- **15 minutes at 75% load**
- **60 minutes at 100% load**

- *Technical Support Services Included* and *Available options*
  - Start up and commissioning work at site - 3 days per unit, single trip
  - On-site training of customer personnel in Operation & Maintenance of the genset immediately following commissioning – 3 days
  - Additional On-Site Technical Services can be provided under a separate purchase order.
  - All travel, hotel and per diem expenses will be charged at cost plus three (3) percent to account for internal admin costs

- *Equipment and Site Installation Drawings*
  - Standard Equipment Drawing Package will be provided with placement of order.

- *Standard Documentation - electronic*
  - Operation Manuals
  - Maintenance Manuals
  - Parts Replacement Manuals
  - Standard Equipment Drawings
  - Standard Connection Diagrams & Drawings

Performance Specifications

Heat Rate	
BTU/kW-hr	9240

Fuel Consumption – 100% load	TBD
Oil Type - required	Mobile Guard 450 Or Shell Capemium

Availability

Typical Operating hours between overhauls	~35,000 hrs
Availability Factor	98%
Total hours per year required for scheduled maintenance	175.2
Total operating hours per year at rated capacity	8584.8
Total allowable operating hours per year at a 110 % load factor	8760
Percent of full load rating required achieving optimal heat rate	75%

Standard Rating Conditions
All engine ratings contained herein apply under the following conditions as specified in ISO 3046-1:

Site Air Intake Temperature	Up to 120° F
Altitude	Up to 4000'
Barometric Pressure	29.61 in. Hg. (100 kPa)
Fuel	Diesel #2

Quoted prices do not include Federal, State or Local taxes which may be applicable. Quoted prices include normal testing, packaging and instructional literature. Special testing, packaging, additional instructional literature, parts, provisioning lists or prints are not included, and prices will be quoted separately

Should you have any questions or comments on this matter, please do not hesitate to contact us.

Sincerely,

Tom Sanders

Cfo/Coo
Arcco Company Services Inc.
225-275-2722
tsanders@arcco.com

Acceptance of Quote

PROPOSAL SUMMARY

Total investment for the above equipment (Not including unloading any applicable tax):

Item		AMOUNT	PRICE EACH	TOTAL PRICE
EMD 2500 KW 6600V 25 HZ GENERATOR PACKAGE	EACH	5	$ 2,318,181.82	$ 11,590,909.09
FREIGHT TO JOBSITE-EST	EACH	5	$ 25,000.00	$ 125,000.00
10000 Gal UL 142 Diesel Tank	EACH	5	$ 25,000.00	$ 125,000.00
Plumbing to tank Est	EACH	5	$ 7,500.00	$ 37,500.00
				$ 11,878,409.09

Prior to ordering equipment or services, please sign and return as a confirmation of the above terms and conditions